

REFERENCES

- Åkerlind, G. (2005). Variation and commonality in phenomenographic research methods. *Higher Education Research & Development*, 24(4), pp. 321–334.
- Akerson, V. L., Buzzelli, C. A. & Eastwood, J. (2010). The relationship between preservice early childhood teachers' cultural values and their perceptions of scientists' cultural values. *Journal Science Teacher Education*, 21, pp. 205-214.
- Alexander, R. (2000). *Culture of Pedagogy: International Comparisons in Primary Education*. Oxford: Blackwell.
- Alves, F. A. C. (2001). *O Encontro com a Realidade Docente. Ser Professor Principiante*. Lisboa: Instituto de Inovacao Educacional.
- Anderson, A., Anderson, J. & Thauberger, C. (2008). Mathematics learning and teaching in the early years. In: Saracho, O. N. & Spodek, B. (Eds.), *Contemporary perspectives on mathematics in early childhood education*. Charlotte, NC: Information Age Publishing.
- Andersson, E. & Lawenius, M. (1983). *Teachers' Conceptions of Teaching*. Göteborg: University of Göteborg.
- Angrosino, M. V. & K. A. Mays de Perez. (2000). Rethinking observation: From methods to context. In: N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research*, 2nd ed. (pp. 673–702). Thousand Oaks, CA: Sage.
- Appleton, K. (2008). Developing science pedagogical content knowledge through mentoring elementary teachers. *Journal of Science Teacher Education*, 19, pp. 523–545.
- Avalos, B. (2011). Teacher professional development in teaching and teacher education over ten years. *Teaching and Teacher Education*, 27, pp. 10–2.
- Ballet, K. & Kelchtermans, G. (2008). Workload and willingness to change: disentangling the experience of intensification. *Curriculum Studies*, 40(1), pp. 47–67.
- Beijaard, D. Meijer, P. C. & Verloop, N. (2004). Reconsidering research on teachers' professional identity. *Teaching and Teacher Education*, 20, pp. 107–128.

- Banks, M. (2009). *Using visual data in qualitative research*. London: Sage.
- Bart, W. M., Yuzawa, M. & Yuzawa, M. (2008). Developing of mathematical reasoning among young children: How do children understand area and length? In: Saracho, O. N. & Spodek, B. (Eds.), *Contemporary perspectives on mathematics in early childhood education*. Charlotte, NC: Information Age Publishing.
- Beswick, K., Swabey, K. & Andrew, R. (2008). Looking for attributes of powerful teaching for numeracy in Tasmanian K-7 classrooms mathematics. *Education Research Journal*, 20(1), pp. 3–31.
- Billett, S. (2007). Exercising self through working life: Learning, work and identity. In: Brown, A., Kirpal, S. & Raumer, F. (Eds.), *Identities at work*. Springer: Dordecht.
- Billett, S. (2008). Learning throughout working life: A relational interdependence between personal and social agency. *British Journal of Educational Studies*, 56(1), pp. 39–58.
- Billett, S. & Somerville, M. (2004). Transformations at work: Identity and learning. *Studies in Continuing Education*, 26(2), pp. 309–326.
- Bleicher, R. E. (2006). Nurturing confidence in preservice elementary science teachers. *Journal of Science Teacher Education*, 17, pp. 165–187.
- Blumer, H. (1969). *Symbolic interactionism: Perspective and method*. Englewood Cliffs, NJ: Prentice Hall.
- Bosman, L. (2006). *The value, place and methods of teaching natural science in the foundation phase*. MEd Thesis. Pretoria: UNISA.
- Botha, M. (2004). *Die evaluering van opleidingsprogramme vir onderwysers in die vroeë kinderontwikkeling en grondslagfase in Suid-Afrika*. MEd Thesis. Pretoria: Universiteit van Suid-Afrika.
- Botha, M., Maree, J. G. & De Witt M. W. (2005). Developing and piloting the planning for facilitating mathematical processes and strategies for preschool learners. *Early Child Development and Care*, 175(7&8), pp. 697–717.
- Botha, M. & Van Heerden, J. (2003). *Challenging and innovative ways in which parents, caregivers and teachers can open young children's eyes to the world of mathematics, science and technology*. Paper presented at the 7th Australian Early Childhood Association Inc, Biennial Conference, Hobart, 10–13 July.
- Brace-Govan, J. (2007). Participant photography in visual ethnography. *International Journal of Market Research*, 49 (6), pp. 735–750.

Bransford, J., Darling-Hammond, L. & LePage, P. (2005a). Introduction. In: Darling-Hammond, L. & Bradford, J. (Eds.), *Preparing teachers for a changing world*. San Francisco: John Willey & Sons.

Bransford, J., Derry, D., Hammerness, K., Berliner, D. & Beckett, K. L. (2005b). Theories of learning and their roles in teaching. In: Darling-Hammond, L. & Bradford, J. (Eds.), *Preparing teachers for a changing world*. San Francisco: John Willey & Sons.

Brock, A., Dodds, S., Javis, P. & Olusoga, Y. (2009). *Perspectives on Play. Learning for Life*. London: Pearson Longman.

Brownlee, J. & Berthelsen, D. (2006). Personal epistemology and relational pedagogy in early childhood teacher education programs. *Early Years*, 26(1), pp. 17–29.

Bruner, J. S. (1961). 'The act of discovery'. *Harvard Educational Review*, 31(1), pp. 21–32.

Bruner, J. S. (1999). Keynote Address. In *global Perspectives on Early Childhood Education* (pp. 9–18). A workshop sponsored by the Committee on Early Childhood Pedagogy, National Academy of Sciences, and the National Research Council, Washington DC.

Brunton, K. (2007). *Beginning Teachers and their Reality of Teaching: Negotiating the Micro-Political World*. ISATT Proceedings 2007.

Burton, D. & Bartlett, S. (2009). *Key Issues for Educational Research*. London: Sage.

Cantrell, P., Young, S. & Moore, A. (2003). Factors affecting science teaching efficacy of preservice elementary teachers. *Journal of Science Teacher Education*, 14(3), pp. 177–192.

Carlone, H. B. Haun-Frank, J. & Kimmel, S. C. (2010). Tempered radicals: elementary teachers' narratives of teaching science within and against prevailing meanings of schooling. *Cultural Studies of Science Education*, 5(4), pp. 941–965.

Carruthers, E. & Worthington, M. (2006). *Children's mathematics. Making marks, making meaning*. London: Sage.

Casey, K. (2007). Phenomenology. In: Bodner, G.M. & Orgill, M. *Theoretical Frameworks of Research in Chemistry/Science Education*. Upper Saddle River: Pearsons Prentice Hall.

Castanheira, M. L., Green, J., Dixon, C. & Yeagerb, B. (2007). (Re)Formulating identities in the face of fluid modernity: An interactional ethnographic approach. *International Journal of Educational Research*, 46, pp. 172–189.

Charlesworth, R. & Lind, K. K. (2007). *Maths and Science for Young Children*, (5th ed). New York: Thomson Delmar Learning.

Charlesworth, R. & Lind, K. K. (2010). *Maths and Science for Young Children*, (6th ed.). Belmont: Wadsworth/Cengage Learning.

CHE. (2010). *Report on the National Review of Academic and Professional Programmes in Education*. Pretoria: CHE.

Cherian, F. & Daniel, Y. (2008). Principal leadership in new teacher induction: becoming agents of change. *International Journal of Education Policy & Leadership*, 3(2), pp. 1–11.

Cherubini, L. (2009). Reconciling the tensions of new teachers' socialisation into school culture: A review of the research. *Issues in Education Research*, 19(2), pp. 83–99.

Chronaki, A. (2005). Learning about 'learning identities' in the school arithmetic practice: The experience of two young minority Gypsy girls in the Greek context of education. *European journal of psychology of education: Special issue on 'The social mediation of learning in multi-ethnic classrooms (XX) 1*, 61–74.

Chronaki, A. (2008). An entry to Greek Roma kids' 'learning identities': encouraging hybridity and dialogicality in the maths classroom. In: Cesar, M & Kumpulainen, K. (Eds.), *Social interactions in multilingual settings*. Sense Publishers.

Cieslik, M. (2006). Reflexivity, learning identities and adult basic skills in the United Kingdom. *British Journal of Sociology of Education*, 27(2), pp. 237–250.

Clasquin-Johnson, M. G. (2011), *Responses of Early childhood teachers to Curriculum change in South Africa*. PhD Thesis. Pretoria: University of Pretoria.

Clements, D. H. (2001). Mathematics in the preschool. *Teaching Children Mathematics*, 7(5), pp. 270–275.

Cohen, J. L. (2008). 'That's not treating you as a professional': teachers constructing complex professional identities through talk. *Teachers and Teaching: Theory and Practice*, 14(2), pp. 79–93.

Cohen, C., Manion, L. & Morrison, K. (2000). *Research methods in education*, (5th ed.). London & New York: Routledge Falmer.

- Coldron, J. & Smith, R. (1999). Active location in teachers' construction of their professional identities. *Journal of Curriculum Studies*, 31(6), pp. 711–726.
- Collin, K., Paloniemi, S., Virtanen, A. & Eteläpelto, A. (2008). Constraints and challenges on learning and construction of identities at work. *Vocations and Learning*, 1, pp. 191–210.
- Cooper, J. M. & Alvarado, A. (2006). *Preparation, recruitment, and retention of teachers*. Paris: The International Institute for Educational Planning (IIEP).
- Copley, J. V. (2000). *The Young Child and Mathematics*. Washington: National Association for the Education of Young Children.
- Cresswell, J.W. (2007). *Qualitative inquiry and research design. Choosing among five approaches*. London: Sage.
- Cross, C. T., Woods, T. A. & Schweingruber, H. (2009). *Mathematic learning in early childhood: paths towards excellence and equity*. Washington: National Academic Press.
- Davies, D. & Howe, A. (2003). *Teaching Science and Technology in the Early Years*. London: David Fulton Publishers.
- Davies, S. (2008). Making a difference in children's lives: the story of Nancy, a novice early years teacher in a Jamaican primary school. *International Journal of Early Years Education*, 16(1), pp. 3–16.
- Davis, B. & Higdon, K. (2008). The effects of mentoring/induction support on beginning teachers' practices in early elementary classrooms (K-3). *Journal of Research in Childhood Education*, 22(3), pp. 261–274.
- Day, C. (2008). Committed for life? Variations in teachers' work, lives and effectiveness. *Journal of Educational Change*, 9, pp. 243–260.
- Day, C. (1999). *Developing Teachers: the challenges of lifelong learning*. London: Routledge Falmer.
- Day, C. (2002). School reform and transitions in teacher professionalism and identity. *International Journal of Educational Research*, 37, pp. 677–692.
- Day, C. & Gu, Q. (2010). *The new lives of teachers (teacher quality and school development)*. London: Routledge Taylor & Francis Group.

Day, C., Kington, A., Stobart, G. & Sammons, S. (2006). The personal and professional selves of teachers: stable and unstable identities. *British Educational Research Journal*, 32(4), pp. 601–616.

De Kock, T. & Slabbert, J. (2008). Personal growth and professional development of student teachers through teacher educational programmes. In: Weber, E. *Educational Change in South Africa: Reflections on Local Realities, Practices and Reforms*. Rotterdam: Sense Publishers.

Denzin N. & Lincoln, Y. (Eds.). (1998). *Collecting and interpreting qualitative materials*. London: Sage.

Department of Education. (2008). *Grade 3 SE leaflet*. Pretoria: Department of Education.

Department of Education. (2011). *Integrated Strategic Planning Framework for Teacher Education and Development in South Africa, 2011–2025*. Department of Education.

Department of Education. (2001). *National ECD policies and programmes*. Pretoria: African Watermark.

Department of Education. (2005). *National framework for Teacher Education in South Africa. Report of the Ministerial Committee on Teacher Education*. Pretoria, Department of Education.

Department of Education. (2007). *National policy framework for teacher education and development in South Africa – ‘More teachers; Better teachers’*. Pretoria, Department of Education.

Department of Education. (1998). *Norms and standards for educators*. Pretoria: Department of Education.

Department of Education. (2000). *Norms and standards for educators*. Pretoria: Department of Education.

Department of Education. (2003). Revised National Curriculum Statement Grade R-9. *Teachers guide for the development of learning programmes: Foundation phase*. Pretoria: Department of Education.

Dewey, J (1933). *How we think*. Boston: D.C. Heath and Company

Dymoke, S. & Harrison, K. (2006). Professional development and the beginning teacher: issues of teachers' autonomy and institutional conformity in the performance review process. *Journal of Education for Teaching*, 32(10), pp. 71–92.

- Egan, B. A. (2004). Constructing a professional identity: Some preliminary findings from students of early years education. *European Early Childhood Education Research Journal*, 12(2), pp. 21–32.
- Eisenhart, K.M. (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532–550.
- Eshach, H. & Fried, N. (2005). Should Science be taught in Early Childhood? *Journal of Science Education and Technology*, 14(3), pp. 315–336.
- Fantilli, R. D. & McDougall, D. E. (2009). A study of novice teachers: Challenges and supports in the first years. *Teaching and Teacher Education*, 25, pp. 814–825.
- Fisher, J. (1996). *Starting from the child*. Buckingham: Open University Press.
- Fleer, M. (2011). Imagination, emotions and scientific thinking: what matters in the being and becoming of a teacher of elementary science? *Cultural Studies of Science Education*, 7(1), pp. 31-39.
- Fleer, M. & Hardy, T. (2001). *Science for children. Developing a personal approach to teaching*, (2nd ed.). Australia: Pearson Education Australia.
- Flick, U. (2008). *Designing Qualitative Research*. London: Sage.
- Flores, A. M. & Day, C. (2006). Contexts which shape and reshape new teachers' identities: A multi-perspective study. *Teaching and Teacher Education*, 22, pp. 219-232.
- Forde, C., McMahon, M., McPhee, A. D. & Patrick, F. (2006). *Professional development, reflection and enquiry*. London: Paul Chapman Publication.
- Freire, P. (1998). *Pedagogy of freedom: Ethics, democracy, and civic courage* (P. Clarke, Trans.). Lanham, MD: Rowman & Littlefield.
- Fullan, M. G. & Stiegelbauer, S. (2000). *The new meaning of educational change*. London: Biddles.
- Furtak, E.M. (2006). *Formative Assessment in K-8 Science Education: A Conceptual Review*. Commissioned paper for the Committee on Science Learning, Kindergarten through Eighth Grade, National Research Council.
- Fuson, K., Grandau, L. & Sugiyama, P. (2001). Achievable numerical understanding for all young children. *Teaching Children Mathematics*, 7(9), pp. 522-528.

Gallenstein, N. I. (2005). Engaging young children in science and mathematics. *Journal of elementary science education*, 17(2), pp. 27-42.

Gee, J. P. & Crawford, V. (1998). Two kinds of teenagers: Language, identity, and social class. In: D. Alvermann, K. Hinchman, D. Moore, S. Phelps & D. Waff (Eds.), *Reconceptualizing the literacies in adolescents' lives* (pp. 225–245). Mahwah, NJ: Erlbaum.

Gillard, L. (2008). *Science knowledge for primary teachers*. New York: Routledge.

Ginsburg, P.H. (2006). Mathematical Play and playful mathematics: a guide for early education. In: D. Singer, R. M. Golinkoff & K.Hirsh-Pasak (Eds.), *Handbook of early child development* (pp. 208–229). New York NY: Oxford University Press.

Ginsburg, P. H. & Ertle, B. (2008). Knowing the mathematics in early childhood mathematics. In: Saracho, O. N. & Spodek, B. (Eds.), *Contemporary perspectives on mathematics in early childhood education*. Charlotte, NC: Information Age Publishing.

Ginsburg, P. H. & Golbeck, L. (2004). Thoughts on the future of research on mathematics and science learning and education. *Early Childhood Research Quarterly*, 19, pp. 190–200.

Green, A. (2008). Researching innovative teacher education practice in the 21st century. *Perspectives in Education*, 26(2), pp. 1–2.

Green, W., Parker, D., Deacon, R. & Hall, G. (2011). Foundation phase teacher provision by public higher education institutions in South Africa. *South African Journal of Childhood Education*, 1(1), pp. 109–122.

Grossman, P., Schoenfeld, A. & Lee, C. (2005). Teaching subject matter. In: Darling-Hammond, L. & Bradford, J. (Eds.), *Preparing teachers for a changing world*. San Francisco: John Willey & Sons.

Haberman, M. (2004). Can state teachers create learning communities? *Educational Leadership*, 61(8), pp. 52–56.

Hallinan, M. T. & Khmelkov, VT. (2001). Recent developments in teacher education in the United States of America. *Journal of Education for Teaching* 27(2), pp. 175–185.

Hamman, D., Gosselin, K., Romano, J. & Bunuan, R. (2010). Using possible-selves theory to understand the identity development of new teachers. *Teaching and Teacher Education*, 26, pp. 1349–1361.

Hammerness, K., Darling-Hammond, L., Bradford, J., Breliner, D., Cochran-Smith, M., McDonald, M. & Ziechner, K. (2005). How teachers learn and develop. In:

Darling-Hammond, L. & Bradford, J. (Eds.), *Preparing teachers for a changing world*. San Francisco: John Willey & Sons.

Hammersley, M. (1981). Ideology in the classroom? A critique of false consciousness. In: L. Barton & S. Walker (Eds.), *Schools, teachers and teaching* (Lewes, UK, Falmer Press), 331–342.

Hargreaves, D. H. (1980). The occupational culture of teachers. In: P. Woods (Ed.), *Teacher strategies: exploration in the sociology of the school*. London: Croom Helm., pp. 125–148.

Healey, M. & Roberts, J. (Eds) (2004). *Engaging students in active learning: case studies in geography, environment and related disciplines*. Cheltenham: Geography Discipline Network and School of Environment, University of Gloucestershire.

Hill, A. (2003). Themes in current educational discourse that impact on teacher education. *Journal of Education*, 31, pp. 93–109.

Hoadley, U., Murray, S. Drew, S. & Setati, M. (2010). *Comparing the learning bases: an evaluation of foundation phase curricula in South Africa, Canada (British Colombia), Singapore and Kenya*. Pretoria: UMALUSI.

Howie, S. J., Barnes, H., Cronje, J., Herman, C., Mapile, S. & Hattingh, A. (2003). *Country profile of South Africa on science, mathematics and ICT (SMICT) education*. Pretoria: Centre for Evaluation and Assessment.

Huberman, M (1989). The professional life cycle of teachers. *Teachers College Record*, 91(1), pp. 31–57.

Hudson, P. & Ginns, I. (2007). Developing an Instrument to examine preservice teachers' pedagogical development. *Journal of Science Teacher Education*, 18(6), pp. 885-899.

James, A. & Prout, A. (Eds.). (1990). *Constructing and reconstructing childhood*, London, Falmer Press.

Jansen, J. D. (2003). Image-ining Teachers: Policy images and teachers identities in South African classrooms. In: Lewin, K., Samuel, M. & Sayed, Y. (Eds.), *Changing patterns of teacher education in South Africa*. Sandown: Heinemann Publishers.

Janssen, F., De Hullu, E. & Tigelaar, D. (2008). Positive experiences as input for reflection by student teachers. *Teachers and Teaching: Theory and Practice*, 14(2), pp. 115–127.

Jita, L. & Vandeyar, S. (2006). The relationship between the mathematics identities of primary school teachers and new curriculum reforms in South Africa. *Perspectives in Education*, 24(1), pp. 39–51.

Joseph, D. & Heading, M. (2010). Putting theory into practice: Moving from student identity to teacher Identity. *Australian Journal of Teacher Education*, 35(3), pp. 75–87.

Kanstoroom, M. (2000). How to get better teachers: a commonsense approach. *Educational horizons (Spring)*, pp. 131–132.

Keiny, S. (2008). ‘Conceptual change’ as both revolutionary and evolutionary process. *Teachers and Teaching*, 14(1), pp. 61–72.

Kelchtermans, G. & Ballet, K. (2002). The micropolitics of teacher induction. A narrative-biographical study on teacher socialisation. *Teaching and Teacher Education*, 18(2), pp. 105–120.

Keys, P. M. (2007). A knowledge filter model for observing and facilitating change in teachers’ beliefs. *Journal for Educational Change*, 8, pp. 41–60.

Kimbell, R., Stabels, K. & Green, R. (1996). *Understanding practice in design and technology*. Buckingham: Open University Press.

Korthagen, F. A. J. (2004). In: search of the essence of a good teacher: towards a synthesis of approaches in teacher education. *Teaching and Teacher Education*, 20, pp. 77–97.

Korthagen, F. A. J. & Kessels, J. P. A. M. (1999). Linking theory and practice: changing the pedagogy of teacher education. *Educational Researcher (May)*, pp. 4–17.

Korthagen, K., Loughran, J. & Russell, T. (2006). Developing fundamental principles for teacher education programs and practices. *Teaching and Teacher Education*, 22, pp. 1020–1041.

Krog, S. & Morehouse, P. (2008). *The early childhood curriculum*. New York: McGraw-Hill Higher Education.

Kyriacou, C. & Kunc, R. (2007). Beginning teachers’ expectations of teaching. *Teaching and Teacher Education*, 23, pp. 1246–1257.

Levine, M. (2002). Why invest in professional development schools? *Educational Leadership*, 59(6), 65–68.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage Publications, Inc.

lisahunter, Rossi, T., Tinning, R., Flanagan, E. & Macdonald, D. (2011). Professional learning places and spaces: the staffroom as a site of beginning teacher induction and transition. *Asia-Pacific Journal of Teacher Education*, 39(1), pp. 33–46.

Lubbe, C. (2003). *The experiences of children growing up in families with same-gender parents*. Doctoral proposal. Pretoria: University of Pretoria.

Lundeen, C. A. (2004). Teacher development: the struggle of beginning teachers in creating moral (caring) classroom environments. *Early Child Development and Care*, 174(6), 549–564.

Lunenburg, M. & Korthagen, F. (2009). Experience, theory, and practical wisdom in teaching and teacher education. *Teachers and Teaching*, 15(2), 225–240.

MacGregor, D. (2009). *Identity formation – Influences that shape beginning teachers' professional identity – Crossing the border from pre-service to in-service teacher*. Refereed paper presented at 'Teacher education crossing borders: Cultures, contexts, communities and curriculum', annual conference of the Australian Teacher Education Association (ATEA), Albury, 28 June–1 July.

MacLure, M. (1993). Arguing for yourself: Identity as an organizing principle in teachers' jobs and lives. *British Educational Research Journal*, 19(4), pp. 311–322.

MacNaughton, G. & Williams G. (2004). *Techniques for teaching young children. Choices in theory and practice*. Australia: Pearson Education.

MacNaughton, G., Rolfe, S. A. & Siraj-Blatchford, I. (2001). *Doing early childhood research: international perspectives on theory and practice*. Australia: Allen & Unwin.

Makiya, H. & Rogers, M. (1992). *Design and technology in the primary school*. London: Routledge.

Manley-Casimir, M. E. (2001). Anchors of stability amidst the tides of change? The challenge to teacher preparation. *Teacher Education*, 41(2), pp. 4–7.

Marcelo, C. (2009). Professional development of teachers: past and future. *Educational Sciences Journal*, 8, pp. 5–20.

Maree, J. G. & Erasmus C. P. (2006). Mathematics skills of Tswana-speaking learners in the North West Province of South Africa. *Early Child Development and Care*, 176(1), pp. 1–18.

- Martin, D. J. (2001). *Constructing early childhood science*. New York: Delmar.
- Martin, D. J. (2003). *Elementary science methods*. Belmont: Wadsworth.
- Marton, F. (1986). Phenomenography – A research approach investigating different understandings of reality. *Journal of Thought*, 21(2), pp. 28–49.
- Maslowski, R. (2001). *School culture and school performance: An explorative study into the organizational culture of secondary schools and their effects*. Twente: Twente University Press.
- Mason, J. (2006). *Qualitative researching*, (2nd ed.). London: SAGE Publication.
- Mawson, B. (2006). Factors affecting learning in technology in the early years at school. *International Journal of Technology and Design*, 17, pp. 253–269.
- Mayer, D. (1999). Building teacher identities: implications for pre-service teacher education. Paper presented to the *Australian Association for Research in Education*, Melbourne.
- Merriam, S. B. (1988). *Case study research in education – a qualitative approach*. San Francisco: Jossey-Bass Publishers.
- Merriam, S.B. (1998). *Qualitative Research and Case Studies Applications in Education*. San Francisco: Jossey-Bass Publications.
- Miles, M. B. (1979). Qualitative data as an attractive nuisance: the problem of analysis. *Administrative Science Quarterly*, 24, pp. 590–601.
- Minger, M. A. & Simpson, P. (2006). The impact of a standard-based science course for preservice elementary teachers on teacher's attitudes towards science teaching. *Journal of Elementary Science Education*, 18(2), pp. 49–61.
- Mothata, S. (Ed.). (2000). *A dictionary of South African education and training*. Johannesburg: Hodder & Stoughton.
- Moustakas, C. (1994). *Phenomenological research methods*. Thousand Oaks, CA: Sage.
- Mouton, J. (2001). *How to succeed in your master's & doctoral studies*. Pretoria: Van Schaik Publishers.
- Moyer, P. (2000). Communicating mathematically: Children's literature as a natural connection. *The Reading Teacher*, 54, pp. 246–58.

Moyles, J. (Ed.) (2010a). *Thinking about play: developing a reflective approach*. Maidenhead: Open University Press.

Moyles, J. (Ed.) (2010b). *The excellence of play, 3rd edition*. Maidenhead: Open University Press.

Moyles, J. (1994). *The excellence of play*. Buckingham, Open University Press.

Mukherji, R. & Albon, D. (2010). *Research methods in early childhood. an introductory guide*. London: Sage.

Munn, P. (2009). Articulating pedagogical principles for early years education. *International Journal of Early Years Education*, 17(1), pp. 1–2.

Newton, D. (2005). *Teaching design and technology*. London: Paul Chapman Publishing.

Nias, J. (1989). *Primary teachers talking: a study of teaching as work*. New York: Routledge Press.

Nieuwenhuis, J. (2007). Analysing qualitative data. In: Maree, K. (Ed.). *First steps in research*. Pretoria: Van Schaik Publishers.

OECD. (2005). *Attracting, developing and retaining effective teachers: Final Report: Teachers Matter*. Paris: Organisation for Economic Co-operation and Development.

Ohana, C. (2007). Creative integration [Theme issue]. *Science & Children*, 44(6), pp. 6.

Olshtain, E. & Kupferberg, I. (1998). Reflective-narrative discourse of FL teachers exhibits professional knowledge. *Language Teaching Research*, 2, pp. 185–202.

Onwu, G. O. (2008). *Dilemmas of identity, practice and science teacher preparation: creating professional identities*. Paper presented at the University of Pretoria. Research seminar.

Osgood, J. (2006). Professionalism and performativity: the feminist challenge facing early years practitioners. *Early years*, 26(2), 187–199.

Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 62(3), pp. 307-332.

Parkison, P. (2008). Space for performing teacher's identity: through the lens of Kafka and Hegel. *Teachers and Teaching*, 14(1), pp. 51–60.

Park Rogers, M. (2011). Implementing a science-based interdisciplinary curriculum in the second grade: A community of practice in action. *International Electronic Journal of Elementary Education*, 3(2), pp. 83–103.

Patton, M. Q. (2002). *Qualitative research and evaluation methods*, (3rd ed). Thousand Oaks: Sage.

Perry, B. & Dockett, S. (2007). Early childhood mathematics education research: What is needed now? *Mathematics: Essential Research, Essential Practice*, 2, pp. 870–874.

Pillen, M., Beijaard, D. & Den Brok, P. (2009). *Beginning teacher identity: Dilemmas and their strategies to overcome these dilemmas*. Paper presented at the 14th Biennial Conference of the International Study Association of Teachers and Teaching, University of Lapland, Rovaniemi, Finland.

Pinnegar, S. (2005). Identity development, moral authority and the teacher educator. In G. F. Hoban (Ed.), *The missing links in teacher education design*. (pp. 259-280). Dordrecht, Netherlands: Springer.

Pound, L. (1998). 'Noses to the worksheets' *Nursery World*, 12 March, pp12-13.

Pound, L. (1999). *Supporting Mathematical Development in the Early Years*. Buckingham: Open University Press.

Pramling Samuelsson, I. & Kaga, Y. (2008). *The contribution of early childhood education to a sustainable society*. Paris: UNESCO.

Reddy, V. (2006). *Mathematics and science achievement at South African schools in TIMSS 2003*. Pretoria: Human Sciences Research Council.

Reio, T. G. (2005). Emotions as a lens to explore teacher identity and change: A commentary. *Teaching and Teacher Education*, 21, pp. 985–993.

Reynolds, C. (1996). Cultural scripts for teachers: Identities and their relation to workplace landscapes. In: Kompf, M. Bond, W. R., Dworet, D. & Boak, R. T. (Eds.), *Changing research and practice: Teachers' professionalism, identities and knowledge* (pp. 69–77). London, Washington DC: The Falmer Press.

Rippon, J. & Martin, M. (2006). Call me teacher: the quest of new teachers. *Teachers and Teaching: Theory and Practice*, 12(3), pp. 305–324.

Rizza, C. (2011). *New Teachers' Working Experience: A Secondary Analysis of TALIS*. Paper presented at the 15th Biennial of the International Study Association on Teachers and Teaching (ISATT), Back to the Future: Legacies, Continuities and Changes in Educational Policy, Practice and Research, Braga, University of Minho.

Rodgers, C. R. & Scott, K. H. (2008). The development of the personal self and professional identity in learning to teach. In: M. Cochran-Smith, S. Feiman-Nemser, D. McIntyre & K. Demers, (Eds.), *Handbook of Research on Teacher Education*, (3rd ed.). New York & London: Routledge.

Rots, I., Kelchtermans, G. & Aelterman, A. (2012). Learning (not) to become a teacher: A qualitative analysis of the job entrance issue. *Teaching and Teacher Education*, 28, pp. 1–10.

Ryan, K. (1986). *The induction of new teachers*. Bloomington, In: Phi Delta Kappa Education Foundation.

Sachs, J. (2001). Teacher professional identity: competing discourses, competing outcomes. *Journal of Education Policy*, 16(2), pp. 149–161.

Samuel, M. (2008). Accountability to whom? For what? Teacher identity and the Force Field Model of teacher development. *Perspectives in Education*, 26(2), pp. 3–16.

Saracho, O. N. & Spodek, B. (2009). Educating the young mathematician: The twentieth century and beyond. *Early Childhood Education Journal*, 36, pp. 305–312.

Saracho, O. N. & Spodek, B. (2008a). History of mathematics in early childhood education. In: Saracho, O. N. & Spodek, B. (Eds.), *Contemporary perspectives on mathematics in early childhood education*. Charlotte, NC: Information Age Publishing.

Saracho, O. N. & Spodek, B. (2008b). Research perspectives in early childhood mathematics. In: Saracho, O. N. & Spodek, B. (Eds.), *Contemporary perspectives on mathematics in early childhood education*. Charlotte, NC: Information Age Publishing.

Schäfer, J. (2011). *An investigation of how visual arts can be used to teach mathematical concepts of space and shape in grade R*. MEd Thesis. Grahamstown: Rhodes University.

Scherer, M. (2004). Love and hate for Math and Science. *Educational Leadership*, 61(5), pp. 5.

Schmidt, W. (2004). A vision for mathematics, in *Educational Leadership, Volume 61(5)*, pp.6-11.

Schön, D. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books.

Schweinhart, L. & Weikart, D. P. (1986). Early childhood development programs: a public investment opportunity. *Educational Leadership*, 44(3), pp. 4–12.

Scott, W. (2002). Creating a knowledge base for teaching: a conversation with James Stigler. *Educational Leadership*, 59(6), pp. 6–12.

Seo, K. (2003). What children's play tells us about teaching mathematics. *Young Children* 58(1), pp.28-34.

Sfard, A., & Prusak, A. (2005). Telling identities: In search of an analytic tool for investigating learning as a culturally shaped activity. *Educational Researcher*, 34(4), pp. 14-22.

Shehan, Constance, L. (Ed.) (1999). *Through the eyes of the child: revisioning children as active agents of family life*. Greenwich, Conn: JAI Press.

Sloan, K. (2006). *Teacher identity and agency in school worlds: beyond the all-good /all-bad discourse on accountability-explicit curriculum policies*. USA: Blackwell.

Silverman, D. (2005). *Doing qualitative research*, (2nd ed.). Los Angeles: SAGE Publication.

Smit, B. & Fritz, E. (2008). Understanding teacher identity from a symbolic interactionist perspective: two ethnographic narratives. *South African Journal of Education*, 28, 91–101.

Smith, R. G. (2007). Developing professional identities and knowledge: becoming primary teachers. *Teachers and Teaching: Theory and Practice*, 13(4), pp. 377–397.

Søreide, G .E. (2006). Narrative construction of teacher identity: Positioning and negotiation. *Teachers and Teaching: Theory and Practice*, 12(5), pp. 527–547.

Stanulis.R. N., Little, S. & Wibbens, E. (2012). Intensive mentoring that contributes to change in beginning elementary teachers' learning to lead classroom discussions. *Teaching and Teacher Education*, 28, pp. 32–43.

Stigler, W. & Hiebert, J. (2004). Improving Mathematics Teaching. *Educational Leadership*, 61(5), pp. 12–17.

Stronach, I. Corbin, B., McNamara, O., Stark, S. & Warne, W. (2002). Towards an uncertain politics of professionalism: teacher and nurse identities in flux. *Journal of Education Policy*, 17(1), pp. 109–138.

Tanchel, G. (1991). MATAL programme for kindergarden children. In: Van Staden, C. J. S. (Ed.), *Early childhood education: do we really care?* Preprimary Education Congress, Pretoria: University of South Africa.

Taylor, N. & Vinjevold, P. (1999). *Getting learning right. Report on the President's education initiative research project.* Johannesburg: The Joint Educational Trust, University of the Witwatersrand.

Ter-Morshuizen, K. J., Thatcher, C. & Thomson, R. (1997). *Primary technology.* Pietermaritzburg: Shuter & Shooter (Pty) Ltd.

Thompson, A. G. (1992). Teachers' beliefs and conceptions: A synthesis of the research. In: D. A. Grouws (Ed.), *Handbook of research on mathematics teaching and learning.* pp. 127-146), New York: Macmillan.

Tickle, L. (Ed.). (1990). *Design and technology in the primary school classroom.* London: The Falmer Press.

Tickle, L. (2000). *Teacher induction: the way ahead.* Buckingham: Open University Press.

Trent, J. (2010). 'My Two Masters': conflict, contestation, and identity construction within a teaching practicum. *Australian Journal of Teacher Education*, 35(1), pp. 1–14.

Tobin, J., Wu, D. & Davidson, D (1989). *Preschool in three cultures. Japan. China and the United States.* New Haven, CT: Yale University Press.

Troman, G. (2008). Primary teacher identity, commitment and career in performative cultures. *British educational Research Journal*, 35(5), pp. 619–633.

Urzúa, A. & Vásquez, C. (2008). Reflection and professional identity in teachers' future-oriented discourse. *Teaching and Teacher Education*, 24, pp. 1935–1946.

Vaillant, D. (2007). Do initial and continuing professional development sufficiently prepare teachers to understand and cope with the complexities of today and tomorrow's education? *Journal for Educational Change*, 8, pp. 175–179.

Vandebroeck, M. (1999). *De Blik van de Yeti. Over het opvoeden van jonge kinderen tot zelfbewustzijn en verbondenheid.* Utrecht: Uitgeverij SWP.

Van Heerden, J. C. (2005). *Implementation of the learning area technology in the primary schools in Gauteng and Free State Provinces.* MEd Thesis. Pretoria: Tshwane University of Technology:

- Van Heerden, J.C. (2011). *Understanding Beneficiaries' Experiences of Quality in Early Learning Centres*. PhD Thesis. Pretoria: University of Pretoria.
- Van Manen, M. (2007). Reflectivity and the pedagogical moment: The practical ethical nature of pedagogical thinking and acting. In: Ian Westbury & Geoff Milburn (Eds.), *Rethinking Schooling*. London: Routledge.
- Van Manen, M. (1990). *Researching lived experience*. New York: State University of New York Press.
- Van Manen, M. 2002. Writing phenomenology. In: M. van Manen (Ed.), *Writing in the dark: phenomenological studies in interpretive inquiry*. London, Ont.: Althouse Press.
- Verhoef, P. (1991). Preformal bridging education: a vital need. In: Van Staden, C. J. S. (Ed.), *Early childhood education: do we really care?* Preprimary Education Congress, Pretoria: University of South Africa.
- Walkington, J. (2005). Becoming a teacher: encouraging development of teacher identity through reflective practice. *Asia-Pacific Journal of Teacher Education*, 33(1) pp. 53–64.
- Watson, A. & De Geest, E. (2005). Principled teaching for deep progress: Improving mathematical learning beyond methods and materials. *Educational Studies in Mathematics*, 58(2), pp. 209–234.
- Watson, C. (2006). Narratives of practice and the construction of identity in teaching. *Teachers and Teaching: Theory and Practice*, 12(5), pp. 509–526.
- Weade R. & Ernst, G. (2001). Pictures of life in classrooms, and the search for metaphors to frame them. *Theory into Practice*, 29(2), pp. 133–140.
- Webster, A., Campbell, C. & Jane, B. (2006). Enhancing the creative process for learning in primary technology education. *International Journal of Technology and Design Education*, 16, pp. 221–135.
- Weikart, D. P. (1991). The high/scope curriculum. In: Van Staden, C. J. S. (Ed.), *Early childhood education: do we really care?* Preprimary Education Congress. Pretoria: University of South Africa.
- Whitelaw, S. (2007). *Novice teachers in a social context: Enculturation in a pseudocommunity of practitioners*. PhD Thesis. Johannesburg: University of Johannesburg.
- Wilke, R. (2004). *How content area influences choice of instructional methods: an examination of one component of preservice teacher belief*. Unpublished master's thesis. USA: The Florida State University, College of Education.

Wilson-Thompson, B. (2005). *Factors influencing teachers' choice and use of tasks for formative assessment of mathematics in Grades 2–6*. MEd Thesis. Johannesburg: University of the Witwatersrand.

Worthy, J. (2005). 'It didn't have to be so hard': the first years of teaching in an urban school. *International Journal of Qualitative Studies in Education*, 18(3), pp. 379–398.

Woods, P., Jeffry, B. & Troman, C. (1997). *Restructuring schools. Reconstructing teachers*. Buckingham: Open University Press.

Yelland, N., Butler, D. & Diezmann, C. (1999). *Early mathematical explorations*. Queensland: Pearsons Publishing Solutions.

Yilmaz-Tuzun, O. (2008). Preservice elementary teachers' beliefs about science teaching. *Journal of Science Teacher Education*, 19, pp. 183–204.

Young, T. & Elliot, S. (2004). *Just Investigate! Science and technology for young children*. Victoria: Tertiary Press.

Young-Loveridge, J. M. (2008). Developing children's mathematical thinking. In: Saracho, O. N. & Spodek, B. (Eds.), *Contemporary perspectives on mathematics in early childhood education*. Charlotte, NC: Information Age Publishing.

Zeidler, D. L. (2002). Dancing with maggots and saints: Visions for subject matter knowledge, pedagogical knowledge, and pedagogical content knowledge in science teacher education reform. *Journal of Science Teacher Education*, 13(1), pp. 27–42.

Zembylas, M. (2005). Discursive practices, genealogies, and emotional rules: A poststructuralist view on emotion and identity in teaching. *Teaching and Teacher Education*, 21, pp. 935–948.

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APPENDICES

Appendix A:
Participants' letter of consent

Appendix B:
Photo collage & written narrative reflection

Appendix C:
Individual semi-structured interview schedule

Appendix D:
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Appendix A: Participants' letter of consent



SUSTAINING THE PROFESSIONAL IDENTITY OF BEGINNING TEACHERS IN EARLY MATHEMATICS, SCIENCE AND TECHNOLOGY TEACHING

Name of participant: _____

Name of investigator: Mrs M. Botha

Dear Participant,

The following information is provided for you to decide if you wish to participate in the research study. You should be aware that you are free to decide not to participate or to withdraw from the research study at any time without explanation or prejudice and to withdraw any unprocessed data previously supplied.

The purpose of this study is to understand how you develop your professional teacher identity in the teaching of mathematics, science and technology in the early years.

The data will be collected at three stages: (1) April 2010: (1.1) Design and handing in of a photo collage and a written narrative reflection, (1.2) 45 minute individual semi-structured interview. (2) July – August 2010: 1 day informal observation and participatory reflection on your teaching. (3) September - November 2010: (3.1) Design and handing in of a photo collage and a written narrative reflection of your first year of teaching, (3.2) 45 minute individual semi-structured interview.

You may ask any questions before participation or during the time of participation. Do not hesitate to ask any questions concerning the data collection procedure. You will also be given an opportunity to verify the accuracy of my expressed views and you will have an opportunity to verify the accuracy of the interview transcripts. I will be happy to share my findings with you after the research has been completed.

The information and data collected are confidential and all the information that you provide will be safeguarded. Your identity as a participant will be known only to me. I will refer to you by pseudonym or a code name in any publications arising from the research.

Please sign your consent with full knowledge of the nature and purpose and the procedures that will be followed during the research. A copy of this consent form will be given to you to keep.

1. I consent to participate in the above mentioned research study, I consent that samples may be collected from the following; my photo collages, my narrative reflections and the individual semi-structured interviews. The collection of data will be at three stages during my first year of teaching.
2. I authorise the use of the photo collages, the narrative reflections, informal observation, field notes, observational reflections and individual interviews for data analysis.

Signature: _____

Date: _____

Tel or cell number: _____

Appendix B: Photo collage & written narrative reflection

Designing a photo collage and writing a narrative reflection on the planning and teaching (professional teacher identity) of mathematics, science and technology (MST) in Foundation Phase (FP) and in Early Childhood Phase (ECP) classrooms

Beginning teachers (April 2010/ September 2010)

1. Designing a photo collage

Guiding question(s) to select images or photos and to design the photo collage.

Think about the way you teach MST. Select any images and/or photos that represent the way you plan and teach mathematics, science and technology (MST). Design and create a photo collage.

Use the following questions to guide you to design and create the photo collage:

- ☞ What do you **believe about MST teaching (planning)** in the early years?
- ☞ How do you **plan and teach** MST? (Explain how you plan your lessons. Give examples.)
- ☞ What do you **believe** about MST? (Nature of MST, the content and curriculum of MST)
- ☞ What did you **learn** about MST teaching and learning during the BEd programme and internship (practice teaching)? / What did you learn about MST teaching and learning during your first year of teaching?



**Please do not use photos where children or the school where you teach can be identified!
Use photos or images that explain your practice.**

2. Write a narrative reflection to explain your photo collage

Browse through the images/photos and write a narrative reflection about what you believe and do when you plan and teach MST in the FP and/or in ECP classroom.

Use the guiding questions in the writing of your narrative reflection:

- ☞ What do you **believe/know about MST teaching (planning)** in the early years?
- ☞ How do you **plan and teach** MST? (Explain how you plan your lessons. Give examples.)
- ☞ What do you **believe/know** about MST? (Nature of MST, content knowledge, pedagogical knowledge and curriculum of MST.)
- ☞ What did you **learn** about MST teaching and learning during the BEd programme and internship (practice teaching)? / What did you learn about MST teaching and learning during your first year of teaching?

Reflection

Examine the images/photos you have selected, and reflect on how these images/photos connect in any way to the questions.

Appendix C: Individual semi-structured interview schedule

Interview questions/prompts (the questions are guidelines and the researcher will further be guided by the photo collage and narrative reflection

The stories of individuals can have their own twists and turns from the original prompts. This flexibility was encouraged during interview sessions. Two interviews were done with each participant. The first interview took place in April 2010 (at the beginning of their first year of teaching) and the second interview was conducted during the September holiday 2010 (during their first year of teaching). The same interview schedule was used for both interviews.

- How do you teach MST?
- What do you teach in MST?
- Why do you teach MST in this manner?
- Explain some of your experience during the teaching and learning of early mathematics, science and technology (MST)?
- What do you believe/know about MST teaching and learning?
- How do you feel about MST teaching in the early years?
- How would you summarise your MST planning?
- How do you plan MST activities? How would you summarise your MST teaching and learning?
- What influenced your early MST teaching?
- What influenced your MST learning?
- How do/did you respond to the influences?

Appendix D:
Gauteng Department of Education letter of consent



UMnyango WezeMfundo
Department of Education

Lefapha la Thuto
Departement van Onderwys

Enquiries: Nomvula Ubisi (011)3550488

Date:	23 June 2010
Name of Researcher:	Botha Mariè
Address of Researcher:	30 Edenpark, 195 Elizabeth Street, Wonderboom Pretoria 0182
Telephone Number:	012 5677358
Fax Number:	012 4205595
Research Topic:	The sustainability of professional teacher identity in the teaching of mathematics, science and technology in the early years
Number and type of schools:	Five [5]; Primary and ECD sites
District/s/HO	Tshwane North and -South

Re: Approval in Respect of Request to Conduct Research

This letter serves to indicate that approval is hereby granted to the above-mentioned researcher to proceed with research in respect of the study indicated above. The onus rests with the researcher to negotiate appropriate and relevant time schedules with the school/s and/or offices involved to conduct the research. A separate copy of this letter must be presented to both the School (both Principal and SGB) and the District/Head Office Senior Manager confirming that permission has been granted for the research to be conducted.

Permission has been granted to proceed with the above study subject to the conditions listed below being met, and may be withdrawn should any of these conditions be flouted:

1. *The District/Head Office Senior Manager/s concerned must be presented with a copy of this letter that would indicate that the said researcher/s has/have been granted permission from the Gauteng Department of Education to conduct the research study.*
2. *The District/Head Office Senior Manager/s must be approached separately, and in writing, for permission to involve District/Head Office Officials in the project.*
3. *A copy of this letter must be forwarded to the school principal and the chairperson of the School Governing Body (SGB) that would indicate that the researcher/s have been granted permission from the Gauteng Department of Education to conduct the research study.*



4. A letter / document that outlines the purpose of the research and the anticipated outcomes of such research must be made available to the principals, SGBs and District/Head Office Senior Managers of the schools and districts/offices concerned, respectively.
5. The Researcher will make every effort obtain the goodwill and co-operation of all the GDE officials, principals, and chairpersons of the SGBs, teachers and learners involved. Persons who offer their co-operation will not receive additional remuneration from the Department while those that opt not to participate will not be penalised in any way.
6. Research may only be conducted after school hours so that the normal school programme is not interrupted. The Principal (if at a school) and/or Director (if at a district/head office) must be consulted about an appropriate time when the researcher/s may carry out their research at the sites that they manage.
7. Research may only commence from the second week of February and must be concluded before the beginning of the last quarter of the academic year.
8. Items 6 and 7 will not apply to any research effort being undertaken on behalf of the GDE. Such research will have been commissioned and be paid for by the Gauteng Department of Education.
9. It is the researcher's responsibility to obtain written parental consent of all learners that are expected to participate in the study.
10. The researcher is responsible for supplying and utilising his/her own research resources, such as stationery, photocopies, transport, faxes and telephones and should not depend on the goodwill of the institutions and/or the offices visited for supplying such resources.
11. The names of the GDE officials, schools, principals, parents, teachers and learners that participate in the study may not appear in the research report without the written consent of each of these individuals and/or organisations.
12. On completion of the study the researcher must supply the Director: Knowledge Management & Research with one Hard Cover bound and one Ring bound copy of the final, approved research report. The researcher would also provide the said manager with an electronic copy of the research abstract/summary and/or annotation.
13. The researcher may be expected to provide short presentations on the purpose, findings and recommendations of his/her research to both GDE officials and the schools concerned.
14. Should the researcher have been involved with research at a school and/or a district/head office level, the Director concerned must also be supplied with a brief summary of the purpose, findings and recommendations of the research study.

The Gauteng Department of Education wishes you well in this important undertaking and looks forward to examining the findings of your research study.

Kind regards

Shadrack Phele MIRMSA
 CHIEF EDUCATION SPECIALIST: RESEARCH COORDINATION

2010-06-23

The contents of this letter has been read and understood by the researcher.	
Signature of Researcher:	
Date:	

**Appendix E:
Schools' letter of consent**



**LETTER OF CONSENT FOR RESEARCH
Departmental schools, Private schools and Early Childhood settings**

Dear

I am currently busy with my PhD on the title:

**SUSTAINING THE PROFESSIONAL IDENTITY OF BEGINNING TEACHERS
IN EARLY MATHEMATICS, SCIENCE AND TECHNOLOGY TEACHING**

The main purpose of my study is to determine how 1st year teachers that have completed the Bachelor of Education (B.Ed.) Early Childhood and Foundation Phase Programme sustain, change or adapt their professional teacher identities in the context of teaching and learning of mathematics, science and technology (MST) at foundation phase (Grade R – Grade 3) and early childhood level classes.

The research question is: How do beginning first-year early childhood and Foundation Phase teachers form, sustain or change their professional teacher identity in the teaching of mathematics, science and technology (MST) in the early years and in different school settings?

I would like to involve _____ a 1st year teacher, in your schools in my research.

To obtain the necessary data for my studies I need to do classroom observation of teaching activities.

Should you agree, please sign the letter of consent below. I shall collect the letter of informed consent at a convenient time, as I need your approval before I can commence.

Yours truly

Ms M Botha

Faculty of Education

Marie.botha2@up.ac.za

Fax number: (012) 420-5595



PERMISSION FOR RESEARCH

I, _____, hereby give permission to Marié Botha to do her research with the above mentioned beginning teachers.

Official: _____ Signature _____ Date _____

**Appendix F:
Parents' letter of consent**



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Education

Ms M Botha

Faculty of Education

marie.botha2@up.ac.za

Fax number: (012) 420-5595

PARENTS' CONSENT

Dear parents

I am currently doing my PhD with the following title:

**SUSTAINING THE PROFESSIONAL IDENTITY OF BEGINNING TEACHERS IN
EARLY MATHEMATICS, SCIENCE AND TECHNOLOGY TEACHING**

The purpose of the study is to understand how teachers in the early childhood and foundation phase develop and sustain their identity in the teaching of mathematics, science and technology. To obtain the necessary data for my studies I need to do classroom observation of teaching activities. Your child's teacher will explain my presence and role in the classroom and I will also take care that I do not intrude on the teaching and learning of your child.

I would appreciate your consent to allow your child to participate in the classroom activities during the observation of teaching procedures. However, participation is voluntary.

Signature _____

Date _____

Thank you.

Marié Botha

Appendix G: Open observation schedule

Observation: actions	Reflective notes
Description of the kind of mathematics, science or technology (MST) activity – Lesson planning	
Description of the pedagogical approach (inquire-based approach, hands on activity, workbooks, discovery learning, exploration, problem solving approach, scaffolding)	
Interaction with the children and children's MST learning	
Interpretation and implementation of the curriculum	
Resource and classroom environment	
Aspects of classroom practice and management	

- **Observational reflection: The six teachers wrote an individual reflection on the planning and on the presentation of the observation activity**



Appendix H:
Clearance Certificate



RESEARCH ETHICS COMMITTEE

CLEARANCE CERTIFICATE

DEGREE AND PROJECT

INVESTIGATOR(S)

DEPARTMENT

DATE CONSIDERED

DECISION OF THE COMMITTEE

CLEARANCE NUMBER :

SM 10/02/03

Sustaining the professional identity of beginner teachers in early mathematics, science and technology teaching

Marie Botha

Science, Mathematics and Technology Education

15 March 2012

APPROVED

Please note:

For Masters applications, ethical clearance is valid for 2 years

For PhD applications, ethical clearance is valid for 3 years.

**CHAIRPERSON OF ETHICS
COMMITTEE**

Prof L Ebersohn

DATE

15 March 2012

CC

Jeannie Beukes
G.O.N Onwu

This ethical clearance certificate is issued subject to the following conditions:

1. A signed personal declaration of responsibility
2. If the research question changes significantly so as to alter the nature of the study, a new application for ethical clearance must be submitted
3. It remains the students' responsibility to ensure that all the necessary forms for informed consent are kept for future queries.

Please quote the clearance number in all enquiries.



Appendix I: Language Editing



Translating.Writing.Editing

Hester van der Walt
HesCom Communication Services
Member: Professional Editors' Group

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LANGUAGE EDITING STATEMENT

2012-03-11

Sustaining the professional identity of beginning teachers in early mathematics, science and technology teaching

by M Botha

- Has been edited for language correctness and spelling.
- Has been edited for consistency (repetition, long sentences, logical flow)
- Has been checked for completeness of list of references and cited authors.

No changes have been made to the document's substance and structure (nature of academic content and argument in the discipline, chapter and section structure and headings, order and balance of content, referencing style and quality).

HESTER VAN DER WALT

